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The Mineral Waters *of* Vittel

GRANDE SOURCE and SOURCE SALÉE

THEIR NATURE AND USES

COMPILED EXPRESSLY FOR THE

MEDICAL PROFESSION

BY

EDWARD LASSÈRE

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PREFACE.

THE application of natural mineral waters to the cure or relief of disease involves much more complicated considerations than is sometimes supposed. Mineral waters are a two-edged weapon demanding the most skilled handling. Hence medical men who send patients to mineral-water health resorts should be well acquainted both with the property of the water at the resort selected and with the ways in which it is likely to be used by the colleague thereat to whom they entrust their patients.

During the past few years the details of hydrotherapy have been considerably modified under the influence of various authorities, including physicists and scientific chemists, as well as medical men. The treatment provided now is not merely curative, but also prophylactic, and may be applied with advantage to children as well as adults. In this connection a statement of Professor Landouzy may suitably be quoted:

> "What is necessary is that the medical profession should learn to take advantage of natural mineral waters and the resources of physio-therapy. If the visitors to mineral-water health resorts included a larger proportion of children, the number of adult visitors would in a few decades correspondingly decrease. Those who otherwise might have been visitors would, having been cured in childhood of their original weaknesses, be less prone to disorders of the throat, bronchi, skin, kidneys, liver, and stomach—less affected by those disease-originating diatheses which children inherit from parents, and at present transmit in their turn to their own offspring, because not submitted to the redeeming qualities of natural mineral waters, and thereby enabled to rid themselves of their ancestral defects."

It rests, therefore, with practitioners anxious for the well-being of the race to transform mineral-water health resorts into true schools of hygiene, moral, physical, and dietetic—into schools of health capable of correcting both original and acquired defects.

VITTEL TREATMENT.

CHARACTERISTICS OF THE WATERS.

Of the numerous springs at Vittel, two only are generally utilized. These are the **Grande Source** and the **Source Salée,** which were *déclarées d'Utilité Publique* (declared a Public Benefaction) by the French Government (Ministerial decree of Dec. 29th, 1903), **being the only springs at Vittel having been considered worthy of that distinction.**

These springs present the rare advantage of possessing a mineralization which is at the same time *sufficient and not excessive.* It is *sufficient* because, contrary to certain so-called medicinal waters, of which the mineralization is two or three times less, or even almost nil, the **Grande Source** and the **Source Salée** have a very active effect upon the organism, of which they excite the nutrition and from which they clear away the waste caused by an imperfect assimilation. Their mineralization is *not excessive* because they do not present either the inconveniences of waters too highly charged with sulphate of lime, a therapeutic agent of contestable value, but also and especially difficult of digestion, nor the dangers of waters too strongly alkaline, which weaken the organism and provoke, by the alkalinization of the urine, the formation of phosphatic gravel, which unites with the uric and oxalic gravel, increasing the volume of the stones. In short, the **Grande Source** and the **Source Salée,** thanks to their very slight tendency to liberate free carbonic acid, never provoke dilation of the stomach as do effervescing waters, especially such as are tampered with by being superaerated, a practice which is condemned by high medical authorities. Also owing to these numerous advantages they enjoy the rare privilege of being used as **table waters with marked medicinal value.**

Technically these waters may be described as mild alkaline bicarbonated sulphated waters, *non-chloride bearing.* The most dominant and characteristic feature is the almost total absence of chloride of sodium or common salt, making these almost unique among mineral waters. This absence of sodium chloride renders them invaluable in all kinds of kidney troubles, arterial and consequent heart diseases, neurasthenia, juvenile epilepsy, etc., etc.

VITTEL TREATMENT,

AT THE SPRINGS.

Vittel treatment is primarily treatment by diuresis, the springs principally employed being two in number—**Grande Source** and **Source Salée.** The composition of the waters they supply, and the indications for their respective use, will be dealt with later on. The average length of a cure, or course of treatment, is twenty-one days. The waters, which are of the non-thermal class, owe their action to their temperature, quantity, and mineral contents. When taken on an empty stomach, they stimulate the movements of that organ by bringing about contraction of its muscles; the emptier the stomach, the greater the rapidity with which the water is passed onward to the intestines. There is thus no delay in its absorption and subsequent elimination by the kidneys, the quantity of urine passed being correspondingly increased and the blood thoroughly cleansed.

The doses required vary in different individuals and diseases; no general rule as to the dosage would apply equally to all cases. Formerly, when water was regarded merely as a means of washing out the stomach and intestines, the quantities prescribed were comparatively large, but they are now, whatever their amount, well within the limits indicated by precise physiological knowledge. In short, the doses are always carefully, and in some cases minutely, graduated.

In some conditions the water is administered on an empty stomach in the morning; in others, a little before meal-times, so as to promote the secretion of purer, and therefore more efficacious, gastric juice. Whatever the dose for the day, it is ordered to be broken up, and the interval between the drinking of each fraction prescribed. The length of this varies with each patient and each disease. The commencing doses are always small, and are increased little by little as the system becomes accustomed to the water. Treatment in bed is only prescribed in certain cases of vascular hypertension, which are elsewhere discussed.

VITTEL TREATMENT,

AT HOME.

Since the **Grande Source** and **Source Salée** waters of Vittel, "thanks to the stability of their composition are admirably fitted for exportation and use at a distance" (Prof. Landouzy), for those unable to take the cure at Vittel itself, corresponding results may, in a great measure, be obtained by an intelligent use of the imported waters, as by treatment at the Resort itself.

Being bottled very carefully and under conditions which obviate all risk of contamination, the water keeps indefinitely. No other spa, indeed, has so far attained the same degree of perfection in the mechanical sterilization of bottles and corks and in the securing of asepsis in filling and bottling its waters as that reached at Vittel; the methods there used afford the consumer the maximum of safety in this respect. In a pamphlet published a few years ago, by Dr. H. J. Johnston-Lavis, entitled "Some Truths about Vittel, Contrexéville and Martigny," speaking of the bottling arrangements at these three stations, he expresses himself thus concerning those at Vittel:

> "At Vittel, the bottle as it arrives from the factory is cleaned, sterilized, then brushed and rinsed in some of the water of the spring, then filled, capsuled, burnished and labelled, all by machinery. The corks are previously sterilized by superheated steam. In fact, some 10 or 12 minutes converts the glass maker's product into a filled and labelled bottle of the **Grande Source** or the **Source Salée** that will keep for months or years, and is of course, free from contamination."

Constantly repeated and most carefully controlled researches prove that even after the lapse of two years or more, bottled Vittel water shows no change whatever, and retains all its properties, provided that the bottles are stored under suitable conditions.

THE "GRANDE SOURCE" WATER.

The first Vittel water to be considered in detail is that supplied by the spring known as **Grande Source.** Its composition per litre (as determined when application was made to the French Government for official recognition of the spring as one of Public Utility) is as follows:

Free carbonic acid	0·0475
Carbonic acid in combination	0·3070
Calcium carbonate	0·2994
Magnesium carbonate	0·0392
Ferri carbonate	0·0032
Calcium sulphate	0·6288
Magnesium sulphate	0·1923
Lithium sulphate	0·0004, 8
Sodium chloride, Potassium chloride	Traces
Sodium silicate	0·0156
Phosphoric acid, Fluorin, Alumen, Magnesium	Traces
Organic matter	0·0205, 2
Residue at 170° C.	1·2025

The indications for the use of the **Grande Source** water are considered in the following paragraphs.

URIC ACID STONES
ejected at Vittel after a course of treatment by the Grande Source.
(*Collection of Dr. Patézon, medical inspector.*)

GOUT.

Treatment by waters of the alkaline class is only suited to chronic gout in weak, anæmic individuals, but this is not the case with **Grande Source** water. It is a typical specimen of the "earthy" class, and as well suited to robust persons, whose attacks take an acute form, as to subacute gout in the weakly. On this point Professor Landouzy says:

> "A patient subject to acute gout will recover on paying a visit to Vittel, and as soon as his attack is over will see the exudations around the affected joints quickly reabsorbed. On the other hand, a subject of chronic gout in a feeble, anæmic condition should go there as long as possible after his last definite attack, and aim at preventing any further recurrence."

But, apart from definite gout, **Grande Source** water is indicated in sundry allied conditions:

1. In the non-arthritic complications of gout, such as congestion of the liver, neuralgia, sciatica, and bronchial catarrh. On this point it may be mentioned that Galezowski, the ophthalmologist, advises treatment by waters of this class in conjunctivitis and iritis of gouty origin, especially when recurrent, and that even varix and phlebitis, when due to the same cause, may be included among the conditions which benefit.

2. In persons threatened with arterio-sclerosis and exhibiting symptoms such as hypertension, rapid action of the heart, polyuria, or traces of albuminuria. These cases require especial care, as any increase of blood-pressure must be avoided, particularly if a lesion of the aorta has already been established.

3. In cases of gouty albuminuria associated with the passage of oxalic or uric acid gravel, or when the albuminuria is seemingly merely functional. But even gouty albuminuria of apparently permanent character and associated with oliguria often lessens in amount or disappears altogether.

URINARY DISORDERS.

Present knowledge of the etiology of œdema, nephritis, and hypertension dictates more care than was common at a time when waters of the earthy class were used chiefly as a means of increasing the permeability of the kidneys. The treatment no longer aims merely at washing out the kidneys and dissipating fluids diffused throughout the tissues. It is only the more lightly mineralized waters of this class that are of service; they withdraw by a process of dialysis some of the sodium chloride impregnating the tissues, and are essential in dechlorhydration treatment. Hence **Grande Source** water is of value in the following conditions: (1) In albuminuria, when this is due to irritation rather than inflammation of the kidney, as is the case when the primary cause is friction by gravel, especially oxalic acid gravel. Such albuminuria disappears during treatment. (2) In slight albuminuria, either of mechanical origin or left behind by a bacterial infection or pregnancy, and unaccompanied either by polyuria or any noteworthy change in the general composition of the urine or increased blood-pressure. (3) In cyclical albuminuria. And, finally (4), as advised by Castaigne, in cases of chronic nephritis presenting evidence of retention of urea, as distinct from dropsical albuminuria.

RENAL LITHIASIS.

Renal lithiasis, whether of the uric acid or oxalic acid type and due to causes such as incomplete proteid combustion, or of the phosphatic type and due to local morbid conditions in the urinary passages is amenable to treatment by the water of the **Grande Source** of Vittel. In the first class of case the object kept in view is counteraction of the effect of the arthritic diathesis by stimulating the vital functions, especially that of the liver, and thus securing more perfect metabolism. In the second, the aim is to promote renal secretion, modify the condition of the lining membrane of the kidneys and urinary passages, and secure evacuation of mucus and sand.

According to von Noorden, the favorable action of earthy waters in the former class is due to their holding back in the intestines any acid phosphate of calcium; hence dibasic sodium phosphate predominates in the urine, which becomes less acid. In virtue of the same consideration, the **Grande Source** water must be regarded as equally indicated in persons of arthritic type, who, without suffering obviously from gravel, pass excessively acid urine which eventually deposits red sand, and who are the subjects either of obesity, dyspepsia, or migraine.

Patients affected with gravel and subject to attacks of lumbar pain are suitable for treatment.

PYELITIS.

Pyelitis is amenable to treatment by the **Grande Source** water, both when complicated by phosphatic deposits—the evacuation of these being hastened by the water—and especially when simple and unaccompanied by gravel. In these cases the diuresis effected acts as a kind of natural drainage.

CYSTITIS.

Cases of subacute or chronic cystitis without obstruction are favorably affected. The pyuria diminishes and the contractility of the bladder improves under the influence of small doses given for a considerable period.

VASCULAR HYPERTENSION.

There is some degree of inadequacy of renal action in most cases of hypertension, and this makes them amenable to treatment by diuresis. The arterial hypertension is at first merely transitory, the observed pressure being sometimes high, sometimes low. It is in this presclerotic stage, when there is nothing more than functional evidence of the vascular trouble, and when neither cardiac nor renal lesions so far exist, that Huchard thinks the treat-

ment best applied, more especially since the gravel or gout almost always associated with the condition are themselves amenable to the **Grande Source** water. For some years past it has been observed, it may be noted, that lowering of tension occurs when chlorides or uric acid are freely discharged.

Another, but less common, type of sclerosis also improves under Vittel **Grande Source** treatment—cases of hypertension accompanied by the passage of large quantities of urine containing few solids. In such patients the permeability of the renal tissues is diminished, and the output of chlorides and of nitrogen compounds is always subnormal. This is the class of cases in which treatment in bed is desirable; the good effect is quickly evidenced by increase in the total renal output both of solids and water, and prognosis may be based on this fact.

OTHER CONDITIONS.

There are sundry other conditions in which use of the **Grande Source** water is indicated. The following in particular may be noted:

Glycosuria.—In glycosuria associated with obesity, gravel, gout, or other evidence of arthritism, if the sugar is of alimentary origin, it is usual to see it decrease and sometimes totally disappear during digestion. The co-existence of moderate albuminuria is not a counter-indication.

Obesity.—In cases of obesity in persons who are distinctly arthritic in diathesis, even though free from its common sequences. In these patients the treatment may be supplemented by physio-therapeutic measures.

Dermatoses.—Certain dermatoses of general origin benefit, as also do certain cases of migraine allied in some degree to arthritism by being associated with overfeeding or a sedentary life.

THE "SOURCE SALÉE" WATER.

BILIARY STONES
ejected at Vittel after a course of treatment by the Source Salée.
(*Collection of Dr. Patézon, medical inspector.*)

The other Vittel water is known as **Source Salée.** Its composition per litre is as follows:

Free carbonic acid	0·0585
Carbonic acid in combination	0·4200
Calcium carbonate	0·3230
Magnesium carbonate	0·1294
Ferri carbonate	0·0003
Calcium sulphate	0,·6178
Magnesium sulphate	0·5805
Lithium sulphate	0·0007, 9
Sodium chloride, Potassium chloride	Traces
Sodium silicate	0·0307
Phosphoric acid, Lithia, Alumen, Manganese	Traces
Organic matter	0·0300, 1
Residue at 170° C.	2·7260

HEPATIC CONDITIONS.

The disorders amenable to treatment by the **Source Salée** water are certain types of biliary lithiasis.

The following are the types in question:

1. Cases of arthritic lithiasis in persons not constitutionally predisposed thereto, but who present evidence of imperfect or retarded metabolism.

2. Cases of repeated biliary colic; in order to provoke a mild attack during which the biliary concretions will pass on without constitutional disturbance. In these cases alkaline waters afford no visible result, but, on the contrary, **Source Salée** treatment generally ends in the expulsion of the stone, if one exists.

3. Convalescence from biliary colic; the improvement in these is very rapid. The extent to which the **Source Salée** water favors the secretion of healthy bile can be seen in the subjects of biliary fistula.

4. Mild, slow cases of almost apyretic angiocholitis. In these

> "mineral-water treatment as an adjuvant to other measures is capable of affording most excellent results.... If the hepatic cellules require specially tender handling, Vittel treatment should be selected." (Gilbert and Lereboullet: *Rap. Con. Franc. de Méd.* Genève, 1908.)

5. Biliary lithiasis associated with constipation due to lack of bile. In these cases alkaline-water treatment is distinctly contra-indicated, but that of Vittel **Source Salée** is especially valuable, more particularly in persons with irritable, easily congested livers.

6. Biliary lithiasis associated with a gouty articular or nephritic manifestation. The combined disorders can be treated simultaneously, if desired, by the **Grande Source** and **Source Salée** waters.

7. Liver disorders in feeble and anæmic persons. Mathieu (in *L'Hygiène du Goutteux*) has pointed out that in liver cases in nervous, thin, weakly subjects the wasting and exciting action of Carlsbad treatment must be shunned, and water of the Vittel type selected.

Other hepatic conditions suitable for treatment are congestion of the liver in gouty persons, accompanied by deficient performance of its functions and cholæmia, whether idiopathic or consecutive to infective lesions of the bile canals.

GASTRIC DISORDERS.

Also susceptible to treatment by the **Source Salée** water are cases of motor dyspepsia associated with gastric atony and biliousness, and the same form of dyspepsia in gouty persons and those with either ordinary or nerve manifestations of arthritism.

The fact that constipation due to insufficient biliary secretion may be successfully treated has already been mentioned. Certain types of muco-membranous enteritis, associated either with biliary lithiasis or uric acid retention, also prove amenable to treatment by **Source Salée** water.

VITTEL TREATMENT IN CHILDREN.

Arthritism in children is invariably the outcome of heredity. Such children, to adopt Grandmaison's phrase, are born "arthritisable"—that is to say, with a morbid predisposition in the cellular metabolism of certain tissues which, unless counteracted, is bound to manifest itself sooner or later. Hence, if heed is to be paid to the views emphatically expressed by Prof. Landouzy in the passage quoted in the Preface to this brochure, Vittel treatment may well be prescribed for the children of gouty parents, especially those who as infants have presented evidence of their inheritance of the diathesis in question. Among the more special indications are the following:

URINARY SYSTEM.

(1) Cases of alternating urine, this being sometimes concentrated and rich in urates, sometimes clear and of low specific gravity. It is always a proof of irregular kidney action. (2) Troubles of micturition, including excessive frequency, incontinence, and vesicular spasm. In these cases the urine is almost always abnormal, being either too rich in urates or in phosphates, or too acid. These manifestations of arthritism have been shown by Comby to occur even in early infancy, and to be the cause of the discomfort some babies show in various ways when passing water. (3) Cases of gravel during childhood and adolescence.

HEPATIC SYSTEM.

Treatment by the **Source Salée** is also indicated in cases of biliary lithiasis, though this is rare in young people.

DIGESTIVE SYSTEM.

Disorders associated with insufficient secretion of bile and slight hepatic engorgement, such as irregular or perverted appetite, alternating costiveness and looseness of bowels, and chronic muco-membranous enteritis. As an adjuvant to general hygienic treatment of these conditions, Vittel Waters are of great value. The same remark applies to migraine and skin lesions in children dependent on imperfect performance of nutritive functions.

NOTES ON THE USES OF THE VITTEL WATERS.

By H. J. Johnston-Lavis,

M.D., D.Ch., M.R.C.S., Engl., Etc. Professor (Fellow) Royal University of Naples.
Senior Consulting Physician R. Victoria Memorial Hospital (Nice-Beaulieu).

We have at Vittel several waters, and consequently a considerable scope for their use in different classes of ailments. Of late years a great change has come over hydrotherapeutic treatment. The violent, highly mineralized waters of Vichy or Carlsbad, Bath, or Harrogate, etc., are being replaced by milder waters, the effects of which may be a little slower in bringing about a cure, but have the advantage in that cure being more substantial and permanent. They do not expose the invalid to the secondary effects of the more heroic water treatment, and are without the disagreeable after results that so often follow the employment of too drastic measures. This is no doubt the outcome of the change in our habits. Gout fifty years ago was in general a widely different thing from what it is to-day, and so treatment then and now must be different.

The **Grande Source**, almost unlimited in amount, gushes out at a temperature of 11° C. and practically never varies in volume or temperature during any season of the year. It is par excellence the spring where uric acid and other waste products or toxines and the diseases associated with their presence are treated. Whatever our views may be as to cause and effect of them in arthritism, gout, the gouty state with its near allies or manifestations, neurasthenia, neuritis, neuralgias, sciatica, certain dyspepsias, intestinal catarrh and above all the different kidney troubles, calculi be they uric, uratic, oxalic, and most of the rarer forms of stone or gravel, we are struck by the specific action of these springs in producing the remarkable results that yearly build up the reputation of Vittel. Even a layman who stops a few weeks at Vittel hears quite enough from the patients themselves to convince him of the large number of cures and cases of marked improvement. Chronic forms of nephritis, adolescent albuminuria, cystitis, prostatis, are all amenable to its beneficent action.

The age of a man has been aptly defined as the age of his arteries. Of late years the researches of Prof. Huchard and others, including some of the physicians of Vittel, have clearly demonstrated that these waters have a specific action in permanently lowering excessive blood pressure and in the treatment of the troublesome and dangerous disease of arteriosclerosis or hardened arteries. In the first stage the arteries are kept in a state of spasmodic contraction and consequently high tension from the circulation within them of blood, loaded with toxines or poisonous substances. This eventually leads to degenerative changes in the arterial walls with higher and more obstinate, increased blood pressure. Finally from the excessive strain so thrown upon the arteries they either burst and cause an apoplexy, or the heart at last fails in consequence of the endless excessive work thrown upon it by the resistance of these hardened blood vessels to its pumping action.

It is particularly in the first stage of this ailment that the **Grande Source** is of so much use. The water is invaluable in the second stage and affords benefit if used with great care even in the final condition of failing heart. Prof. Huchard and many other physicians have sent numbers of patients here each year, and I find that few or none go away without marked benefit.

Another type of ailment, neurasthenia, so common nowadays, I pointed out some years ago as being particularly ameliorated by a visit to Vittel. Neurasthenia in my earlier professional days I looked upon as an almost in-

curable disease. From the moment that I realized that it was a form of toxæmia or, to put in vulgar parlance, "goutiness" of the nervous system, the whole scene changed and I consider myself very unfortunate if any patient suffering from "nerves" does not go home after a suitable cure at Vittel, adapted to each special case, practically well, or at any rate far on the road to complete restoration.

Another ailment which shows marked improvement, I have noticed, among the few cases that have come here more by accident than intent, is juvenile epilepsy. One or two cases that did the cure here completely lost their fits, and others have been markedly improved. Probably the relief of the toxæmic condition, which plays such an important part in epilepsy, and the dechlorurizing effect of Vittel water will explain this.

In that condition of chronic toxæmia called "goutiness" the **Grande Source** has its largest scope. In the articular, muscular and fibrous forms such as lumbago it acts as a specific. It is equally effective in the very varied visceral manifestations such as chronic bronchitis, some forms of asthma, some liver and stomach ailments. In neuritis not only does it render great service in the gouty form but finds its use in chronic nerve inflammation from other causes, such as malaria, alcohol, etc. Finally many remarkably resistent skin diseases are vanquished by a cure at Vittel.

Its continued use as a table water, far from presenting any inconvenience whatsoever, is eminently favorable to the stomach, the secretions and the muscular tone of which become improved.

The **Source Salée** is composed of the same elements as the **Grande Source**, but much more higly mineralized in magnesia. It derives its reputation from the marked curative effects it has in different ailments of the alimentary canal. Flatulent dyspepsia often quite disappears after a short course, and the same may be said of mucous or membranous colitis where it may in addition to drinking be used for intestinal lavage with marked benefit. Chronic constipation cases and those of recurring appendicitis have found much benefit by its use. It is however in its influence on the liver that the therapeutic value is most strikingly evident. Liver congestion, whether due to alcohol, sedentary habits, malaria, Malta fever or other causes, rapidly improves. The number of cases of jaundice that are cured and of gall stones that are got rid of every year by its use brings number of victims of that terrible complaint to Vittel each season. Certain forms of diabetes of hepatic or pancreatic origin are quite cured by the use of the **Source Salée**, and in consequence of its power of removing abdominal congestion it is used with much benefit in piles and in convalescence from malarial and other tropical ailments. Large numbers of obese people resort to it to reduce their weight. Finally in certain forms of chronic bronchial catarrh and asthma, probably of a gouty strain, marked improvement follows its use.

The water of the **Source Salée**, *laxative but not purgative,* exercises an elective action upon the *liver*, the more precious because it does not provoke *any symptoms of anæmia* or *weakness*, but is on the contrary very well tolerated by the organism and particularly by the stomach.

Let me further remark that the water of the **Source Salée** is not at all salt, but on the contrary very agreeable to drink. The bicarbonates of lime, of magnesia, of iron and of lithine give it tonic and depuratory properties which render it digestive and make it a very agreeable and salutary table water; mixed with wine which it does not change in any way, it counteracts the acidity of the liquids in the stomach, excites the appetite, stimulates the digestion, and maintains the regularity of the functions of the liver and of the intestines; it is specially recommended to women whose sedentary habits predispose them to debility of the digestive tube.

This incursion into the scientific domain may be concluded by the remark that the Vittel waters keep remarkably well in bottles, and that they have preserved up to the present their *superiority from a bacteriological point of view,* verified in 1894 by the Académie de Médecine.

ADJUVANTS IN VITTEL TREATMENT AT THE SPRINGS.

Mineral-water treatment is far from being the sole factor in the patient's cure at Vittel, for Professor Landouzy has shown that much importance is to be attached to "the adjuvants to the special treatment—namely, the environment and general treatment of the patient during the few weeks that he is being submitted to the action of the water *intus et extra*."

ENVIRONMENT.

Climate.—The climate of a place demands almost the first consideration when arthritic cases and exhausted constitutions are in question.

Altitude.—On this point it may be said that Vittel, situated as it is at an altitude of some 1,160 feet on the edge of the forest zone of the Vosges and Haute-Saône region, enjoys a Continental climate in all its purity. It is never very hot, even in the height of summer.

Surroundings.—Built as it is in the open country, at a distance from any large town, Vittel suggests in its general appearance a vast garden, with borders merging insensibly into surrounding uplands of decided beauty.

Natural Drainage.—The ground has a sufficient fall to provide excellent natural drainage, while desirable dryness of soil is further secured by the small woods and pine plantations amid which the resort lies.

Atmosphere.—The woods and the neighboring great forests play another useful part; the ozone which they generate in such abundance is a constant safeguard of atmospheric purity.

Ozone.—The proximity of the Vosges Mountains also contributes to the supply of ozone; one physical effect of this when present in abundant quantity has been shown by Hayem to be an increase in sleeping power. The truth of this observation has been clearly proved by the experience of Vittel.

Temperature.—The fact that the air temperature is always cool, even on the hottest days of summer, is a further factor in successful treatment.

In short, the climate is such as to diminish cutaneous respiration, and facilitate renal secretion and the general nutrition of the system.

BALNEO-THERAPY.

In view of its action on tissue change, the value of balneo-therapy cannot be overlooked in the treatment of disorders of nutrition. Very rightly, therefore, much attention is paid to the subject at Vittel. A building equipped with all the most modern appliances of balneo-therapy has been provided, and the arrangements made secure that all bath and douche treatment shall be applied in thoroughly scientific fashion. The mineral water for bath use is stored at as low a temperature as possible in a series of cisterns placed at different heights from the ground, in order to secure the precise degrees of pressure required to meet the varying needs of patients and the stage which their cure has reached. The water is raised to the required temperature by means of hot-air coils, but this heat is never allowed to pass 80° Centigrade, so that there may be no interference with the gaseous and mineral contents of the water. Each douche apartment has its own independent supply, in order that no undesigned alteration in temperature or pressure may occur. Close to the douching-rooms are a series of vapor, Roman, carbonic, acid, electric, and douche-massage baths. Finally, by way of making the arrangements thoroughly complete, rooms are provided for vaginal and ascending douches.

The excellence and comprehensive character of the balneo-therapeutic arrangements make it possible to secure for each patient precisely the treatment he requires, and led to Bardet saying at the end of a tour round European health resorts that he had never seen the desiderata of balneo-therapy so well appreciated and carried out as at Vittel.

MECHANO-THERAPY.

As Vittel patients commonly require special forms of exercise, one hall in the Cure-House has been fitted up with mechano-therapeutic appliances of all kinds. Not only do these appliances make up for any lack of inclina-

tion for exercise, but, since the muscular contractions they produce are regular, a healthy circulation is promoted, the terminations of nerve filaments stimulated, and due oxidation obtained. Another advantage is that the amount of work done by the muscles can be graduated with almost mathematic precision according to the needs of each patient at the moment, besides being made either purely passive, purely active, or a mixture of the two. The passive movements are specially useful in dealing with the muscular and articular results of old gout, for the daily movements, in addition to freeing stiffened joints and stretching contracted tendons, lead to progressive movement in the nutrition of the tissues concerned, and thus form a valuable adjuvant to Vittel treatment.

WARM AND SUPERHEATED AIR.

The visitors to Vittel include many sufferers from chronic pain, in whom warm air applications as an adjuvant in treatment proves of value. Patients, for instance, with neuralgia of rheumatic or gouty origin, general muscle pains, and lumbago of obstinate character, are often quickly cured by combining Vittel treatment, warm-air applications, and vibratory massage; the relief from pain is in many cases immediate, and becomes permanent after a certain number of sittings.

In cases of long-standing sciatica, chronic arthritis, stiff and ankylosed joints, superheated air is to be preferred. After a few applications coupled with massage, movement becomes freer, the local circulation is improved, and exudations rapidly clear up. Indeed, as an adjuvant to Vittel treatment, the indications for the use of either warm or superheated air are numerous. It constitutes, perhaps, the most important physical remedy available, and in combination with massage and mineral water may be regarded as essential in the treatment of arthritics.

MASSAGE.

Massage is frequently a useful, and sometimes an indispensable, adjuvant to treatment. In cases of defective nutrition the system must be freed from the waste matter encumbering. it. This is the task of Vittel water, and it is aided therein by massage, which makes these waste matters re-enter the circulation, and thus facilitates their elimination by diuresis. At the same time it reflexly stimulates the sympathetic system and improves the general circulation. Massage also comes usefully into play in cases of constipation due to insufficiency in bile secretion. On these Vittel water has a special action, and massage of the liver assists it. Finally, massage is of importance in dealing with the cases of hypertension which come to Vittel, for the work both of Cautru and Huchard has proved that its action on the vasomotor system is in the nature of a preventive, and thus a valuable ally to the rest of the treatment.

ELECTRIC INSTALLATIONS.

The electric appliances in use differ in no wise from those found in well-equipped hospitals and nursing homes in large cities. In the treatment of joint conditions and of the gouty and neuralgic, electric baths play a considerable part, sometimes as local, sometimes as general applications. They are also employed in cases of obesity and hypertension in order to provoke perspiration and increase the output of metabolic products. The X-ray outfit provided often proves of much assistance in confirming or negativing the existence of renal or hepatic calculi.

OPEN-AIR EXERCISES.

The provision for what has been termed "Oertel treatment" is of a satisfactory kind, promenades of all gradients being available. Originally this system of graduated exercise was reserved for myocardiac cases, but is now being employed with increasing frequency in all conditions associated with imperfect nutrition, and also in the obese, especially when accumulations of fat round the heart are suspected. In the case of those whose exercise need not be precisely regulated, golf, clay-pigeon shooting, and whatever more active sports, such as tennis, may be considered desirable, form valuable aids in treatment, especially as they all centre round the establishment itself.

DIETING.

Increasing importance is attached to the dieting of patients at mineral-water resorts, and at Vittel careful dieting is held to be an essential part of treatment. As practised at Vittel, an additional advantage is secured; the attention paid to the subject helps to educate the patient in matters dietetic. Before his treatment is over he realizes not only what his diet should be, but also that adherence to it entails no particular difficulty or privation.

It is to Germany that a good many advances in the dieting of spa patients are due; but the Germans, it must be added, have endeavored to exploit a belief that only in Germany can patients be suitably dieted. Hence at most mineral-water health resorts uncooked fruit, even though perfectly ripe, is excluded from the diets permitted, while sausages *et id genus omne* figure freely therein. At least one reason for this fact is that while Germany is not particularly well off for fresh fruit, food of the other kind mentioned is plentiful and cheap. At Vittel things are otherwise managed. Dieting, when it is required, is strictly observed there, but no attempts are made to enforce one common diet for all alike, as is the case, for instance, at St. Nectaire, where about 80 per cent. of all the patients are albuminurics, or as at Châtel-Guyon, where there are only four never-varying diets. At Vittel there is such variety in the disorders treated that systems of the kind mentioned would be undesirable, even if it were not recognized how right Landouzy was when he said that it was illogical to confine a patient to the same food during the whole of his treatment, since the real needs of his system must vary with the progress of his case.

In view of these considerations, Vittel, with the co-operation and advice of the medical men established there, has adopted the following plan in catering for the food needs of its invalid guests. Since a majority of all Vittel patients are sufferers from one form or another of arthritism, the foodstuffs used in the regulation diets are chosen from among those suitable to the common run of such cases. This important differentiation among foodstuffs being established, the bill of fare for the day is in its essential constituents always suitable for an average case of gout or gravel, and it becomes quite an easy task to alter the dishes placed before each patient so as to make them precisely suited to his particular needs, whether his case be one of lithiasis—uric acid, oxalic acid, phosphatic, or biliary in type—or whether his diathesis manifests itself in disorders of his cutaneous or nervous system, or of his circulation. It is only the arthritic patient with glycosuria whom the foodstuffs in question do not habitually suit, and for whom other foodstuffs must be chosen in view of the necessity of restricting his intake of carbohydrates. It should be added that all the dishes entering a regulation diet are cooked on special lines.

This system meets the needs of the great majority of all patients, and it is only exceptionally that the regulation diets do not suit a patient, and special arrangements have to be made for him; in such cases his meals are prepared according to the specific instructions of his medical attendant.

REGULATION DIETS.

To facilitate the preparation of regulation diets, each visitor needing to be dieted is handed by his medical attendant a list, on which is marked what food materials are suitable for him, or otherwise, and this in his turn the visitor hands to the head waiter of his hotel.

The value of the system of Vittel has been so well demonstrated that it has now been adopted at some other health resorts. The regulation diets give rise to no difficulty, the menus proving so acceptable to the patients that when their time at Vittel is up they are quite prepared to adhere, if need be, to the same form of food for as long a time as may be desirable.

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SOME EXAMPLES ILLUSTRATING CASES OF CHRONIC TOXÆMIA AT VITTEL.

By H. J. Johnston-Lavis, M.D., D.Ch., M.R.C.S., etc.,

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Perhaps in the whole history of the growth of a spa or hydro-mineral station none can compare with the remarkable rapidity with which Vittel has jumped into fame. Ten years since it was known to comparatively few physicians, and ranked as a fourth or fifth rate station so far as its resources and number of visitors were concerned. It now stands in the very first rank.

I have practised there seven seasons, and done two cures there myself annually, and may, therefore, claim to speak with some experience. I propose to select a few of my cases from one season's (1909) practice, and to point out the results as an illustration of the beneficent action of the cure in somewhat varied ailments. The cases of *"physiological disequilibrium"* and ailments that are relieved by Vittel treatment, of however varied facies, may all be summed up as the result of *chronic toxæmias* due to either perverted nutrition, defective metabolism, or incomplete elimination. This condition, which we English physicians denominate as "goutiness" and the French medical man as *arthritique*, is ill expressed by such terminology. All originate in an excess of one or more of the normal constituents of the blood or the presence of abnormal ones. When we look at these different *disturbances of the physiological balance* we shall all the more clearly appreciate the close association of many different ailments. We shall also be able to comprehend how a cure such as Vittel is one of the most effective and rational methods of restoring *physiological equilibrium*.

Who can draw the border line between acute and chronic gout, calculosis, some forms of nephritis, arterio-sclerosis, neurasthenia, asthma, chronic bronchitis, some dyspepsias and entero-colitis, many skin diseases, neuritis, some rheumatisms, etc.?

When I have at other times sustained this thesis, critics have held me up to ridicule. My answer has been, Think over it, and tell me why we so often find several such states associated in the same individual at once or alternating with each other, and why the same cure with suitable modifications is so efficacious in relieving or curing each of these troubles.

All the analyses are of the entire and carefully collected quantity of twenty-four hours. They are made in my own private laboratory, fitted with the most modern and approved apparatus by my analyst, Dr. Burrais, of the Pasteur Institute. He knows nothing of the cases, and is therefore quite free from any personal equation modifying the result. All the results are calculated on the personal equation of each individual based on weight, height, and age. Where extraordinary results are obtained, both of us repeat the determination. All calculations are based on the personal coefficient. I have much pleasure in thanking him for his valuable and skilful assistance.

Case No. 1.

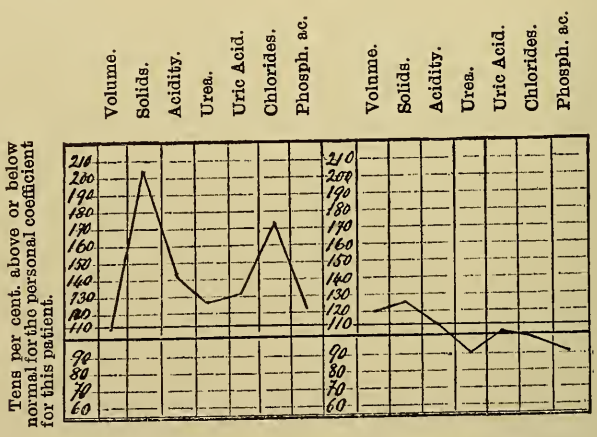
J. M., aged 58, 6 ft., weight 77 kilos, sent by the late Dr. Radcliffe Crocker. Has suffered for years from eczema on neck, fingers, toes, and fork of legs. He complained of feeling stiff in his movements, lacking energy, and always tired. Has also patches of psoriasis on knees. Two fingers and one toe suppurating around nails, the region of which is red, swollen, and angry. There is no syphilitic history. The son is a fine specimen of an officer in the Guards, wife in good health. Patient has always been temperate, has fairly good

digestion, but takes an aperient every morning, "which keeps him all right." His skin acts freely. He is otherwise a strong, healthy man. He has been twice to Homburg, and three times to Schinznach, with little benefit.

On July 18th, day after arrival, had a mean blood pressure of 135 mm. His urine is represented in the diagram illustrated here, which is remarkable by the enormous amount of solids, composed of all the elements of the urine, but specially chlorides, which were 73 per cent. in excess. His urea-uric acid coefficient is sensibly normal, but both are increased nearly thirty per cent. above what they should be.

After a few days he was drinking 1.800 c.cm. of **Grande Source** before breakfast, and 900 c.cm. in the afternoon. The skin was kept active with baths at 36° C., and a low semivegetarian diet ordered, excluding salt as much as possible.

Another twenty-four hour urine analysis, made on August 9th, one day after the cure was stopped, shows a remarkable change. The curve has the same general form, but approaches quite near to the normal line. Solids have fallen from 204 to 125 per cent., acidity from 144 to 110 per cent., urea from 128 to 90 per cent., uric acid and chlorides to normal, and phosphates to 9 per cent. below normal.



J. M., July 20th, 1909.

Traces of some reducing material (? glucose). Slight traces of true and modified biliary pigments and of scatol. Abundant deposit of urates and some pavement epithelium. Purins 0.518 per 24 hours.

August 9th, 1909.

True biliary pigments in traces, as also faint reaction of scatol. Urates and cells much less. Purins 0.689 per 24 hours.

Simultaneously with this all his feelings of stiffness, loss of energy, etc., have disappeared, and all his skin lesions are rapidly healing.

I think we have here a case of excessive assimilation which led up to a state of autointoxication in which the skin was most affected, but he was on the verge of an outbreak of joint, muscular, and nervous trouble.

The lixiviating effect of a rapidly absorbable and rapidly excretable *non-chloride-bearing* waters is striking.

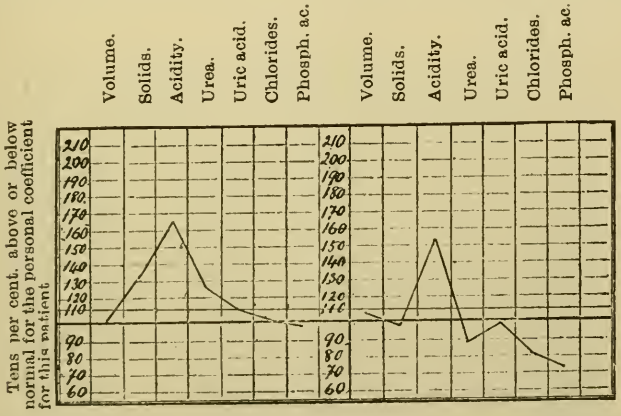
The purin bodies as a whole seem to have increased at the end of the cure. Whether we can interpret this as increased production or increased excretion of a retained stock could only be determined by ulterior analyses, which unfortunately could not be obtained.

The following three cases I have chosen because they consist of father, mother, and adult daughter living under sensibly the same conditions, and furthermore that, as they enjoyed Vittel so much, they stopped on for some weeks after their cure, and the second urine analysis was made at a considerable interval after their "cures" had stopped. These are rare opportunities, and I think worthy of study.

Dr. Curgenven, who sent them to me, says: "Mr. S. had an attack of cardiac weakness and irregularity about two years ago—a very irregular pulse, high arterial tension, a tendency to dyspnœa, and a dilated stomach; this was caused, I think, by living at too high a pressure, and too generous a diet. With rest and careful dieting he soon improved. A year ago he had a mild attack of basal pneumonia, and he has occasional attacks and threatenings of lumbago."

Case No. 2.

The patient, Mr. S., is a hale and hearty looking man, aged 60. His digestion is fairly good, except for a little flatulence; the bowels regular. Cardiac area faintly increased when the heart is working at its normal rhythm. When I made my first examination, on July 23rd, his pulse was running at an almost uncountable rate. After various attempts and dodges I made it 192. While making notes of this and other observation, occupying about three minutes, I returned again to feel the pulse, when to my astonishment it was a steady, vigorous beat of 72. His mean blood pressure was 140 mm. He himself attributed his cardiac condition to extra smoking, he having filled in all the time of travelling by doing it. He was suitably dieted, and alcohol, tobacco, tea and coffee restricted. At the end of three weeks all his cardiac



Mr. C. S., July 25th, 1909.

Modified biliary pigments fairly abundant; indican marked; scatol slight traces. Purins 0.798. Abundant crystals of uric acid and urates, and also oxalates. Some epithelial cells.

August 23rd, 1909.

Modified biliary pigments normal; indican fairly marked: scatol traces. Purins 0.717. Urate of soda, very few oxalates, and epithelial cells.

symptoms had disappeared, his digestion was all right; he expressed himself as feeling quite well. His pulse was still at 72, but his blood pressure had fallen to 115. Several days after stopping the cure this favorable state persisted.

The urine analysis before the beginning of the cure shows a large excess of nutritive substances and their waste products that the organism was making a great effort to excrete. In the urine analysis after the end of the cure we see that the solids, which were 133 per cent., have fallen to just below normal. The acidity has been but little reduced, only amounting to 12 per cent. less. Urea was reduced from 127 to 89 per cent., and uric acid to normal. Before the cure urea was much higher than the uric acid, whereas after the ratio was reversed, showing the great utility of the waters in restoring the proper ratio of these two bodies; in fact, this is almost universal, and clinically I have always found that when marked benefit has accrued this has been the case, and where absent the cure has been of less use.

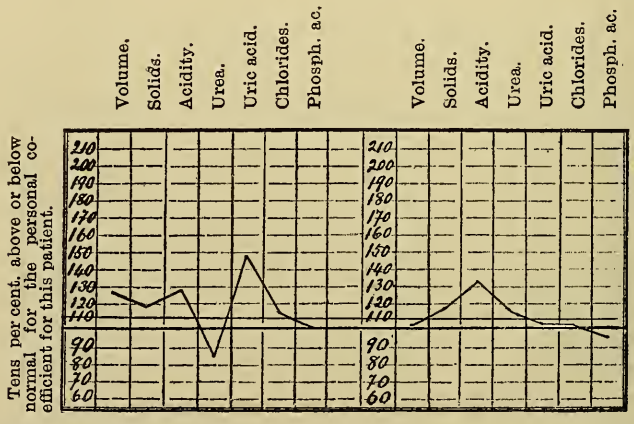
The chlorides and phosphates had fallen considerably below normal. Diet will explain the former but the latter is more difficult to interpret.

Here we have an illustration of four distinct elements leading to chronic toxæmia—excessive smoking, alcoholism, feeding, and mental activity. This

led to general circulatory spasm, in which both arteries and heart were affected. That true arterio-sclerosis had set in is disproved by the rapid fall of blood pressure under treatment, but no doubt a continuance of the patient's mode of living will soon lead to irreparable artery and heart changes.

Case No. 3.

Mrs. S., wife of the last patient, aged 45, of slim build, is congenitally partially deaf; is a very nervous woman, partly due to that defect; gets bad rheumatic pains, especially in shoulders, and stiff neck, which are specially excited by champagne and strawberries. She has occasional bad headaches but is a great cigarette smoker, and has marked arcus senilis. Heart sounds normal except that aortic valves closed with a slight clang. Has had several children living, and two bad miscarriages and fibroids. Menopause at 42. Digestion is good but has to take cascara. Sleep moderate, perspiration very free. Takes plenty of exercise—golf, etc. Urine analysis at commencement of cure shows solids and acidity too high, urea 15 per cent. below normal and uric acid 47 per cent. above—a very great disproportion. Besides the cure she had some general massage with Vigorax, a dietary in which fats and oxalate-bearing foodstuffs were excluded. The result of this was a vast improvement in her health—she became less nervous, her pains disappeared as



Mrs. S., July 25th, 1909.

Traces of true and modified biliary pigments. Scatol reaction very marked. Purins 0.922. Fair quantity of urates, oxalates, and pavement cells.

September 3rd, 1909.

Traces of true and modified biliary pigments, and traces of scatol. Purins 0.206. Urate of soda fairly abundant; only a very few oxalates. Pavement epithelium cells and rhomboidal cells.

well as her headaches. A second analysis made some time after the cure terminated shows that both the quantities and ratio of uric acid and urea have been readjusted to practically normal.

In this case we have a chronic toxæmia due to incomplete metabolism, urea being replaced by an excessive production of uric acid and oxalates. The cure has resulted in the rise of urea to above normal, coincident with the fall of uric acid to normal and the almost total disappearance of the oxalates. The purins as a whole fell to less than a quarter of what they were before treatment. How much of this was due to the food consumed it is difficult to say, yet both husband and wife were following much the same menu at the hotel.

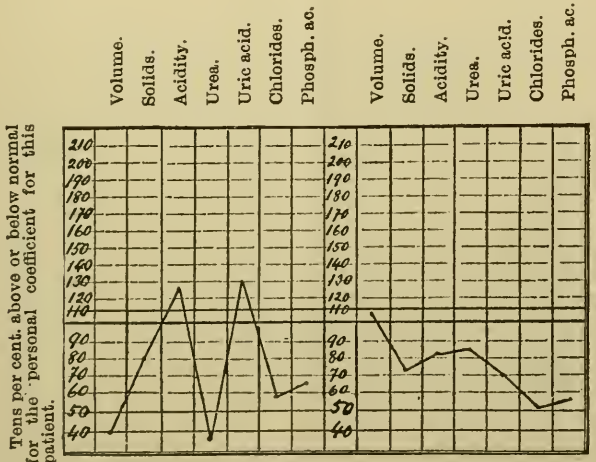
Case No. 4.

Miss S., the daughter, aged 25, weighed 79 kilos, and is for her height and age obviously obese, so differing from her parents and also a younger sister who accompanied the family. As a girl she was always anæmic, has some

dysmenorrhœa, but loses little. Had measles five years ago, and gets a delicate throat and is hoarse when tired or cold, which she attributes to that disease. Suffers at times from facial neuralgia. Mumps three years ago; has facial neuralgia since. Three years ago suffered from rheumatic pains. Leads a very active life. Digestion is good; the bowels, once troublesome, are now all right. She is a small eater and deep sleeper. Mean blood pressure 130 and an arrhythmic pulse of 80. Physical examination showed no apparent cause for this.

The twenty-four hour urine analysis at the beginning of the cure is very interesting. The volume is 60 per cent. below normal, due, I believe, to the stupid superstition that privation of fluids helps to thin people. This old and unscientific doctrine still has a hard and dangerous hold upon the public, and I am sorry to say is still a fetish of many medical men. Only those who have constantly to diet people can appreciate the difficulties in overcoming popular prejudices when one has to directly traverse the orders of one of one's colleagues.

The patient's excretion of solids is 20 per cent. below normal, due in great part to an insufficiency of the vehicle water, but also to the low chloride assimilation. Acidity is 26 per cent. above normal, whilst urea is only a little above one-third of the normal amount, whilst uric acid is 30 per cent. above normal.



Miss S., July 25th, 1909.

Both true and modified biliary pigments abundant; no indican, but scatol abundant. Purins 0.244. Urates abundant, large crystals of uric acid and some small oxalates and numerous pavement cells.

September 1st, 1909.

True and modified biliary pigments slight traces, and traces of scatol only. Purins 0.664. Urate of soda, rare crystals of uric acid, no oxalates.

The patient is a small salt eater, probably in harmony with a defective assimilation of salt. The phosphates are also 34 per cent. below normal. The urine is burdened by urates, uric acid, oxalates, biliary pigments, scatol, etc.

The second analysis, made some time after the cure had finished but with the patient otherwise living under exactly similar conditions, shows a curve much more approaching the straight line representing normal, though still showing defective assimilation, but to a much less marked extent. Biliary pigments and scatol had markedly diminished, but strangely the purin bodies were nearly tripled, probably from some exogenous source. The further diminution in chlorides was probably partly due to diminished intake and considerable losses by the skin, as the patient was doing several hours of tennis besides being massaged.

During the cure her weight fell from 79 kilos to 77.450, and continued to diminish, but I have no record of what it really was on her departure from

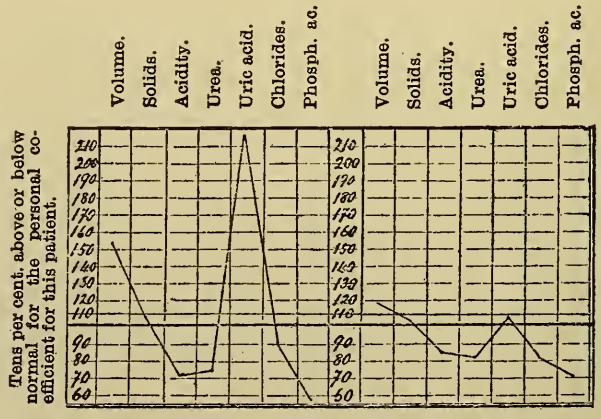
Vittel. She declared herself perfectly well, much more capable of energy, and all her functions in good order.

In this case we have another example of perverted assimilation and defective metabolism where the part most assailed seems to have been the adipose tissues.

Case No. 5.

Miss B., aged 24, had malaria as a child, but has had no traces for many years. As a big girl had eczema very badly, but that has gone long since. Four years since had "neuritis" in the right arm, supposed to be due to tennis. No other region was involved. She is nervous, neuralgic, rheumatic, has some fullness of the eyes not amounting to exophthalmos, but no other thyroid symptoms. Her digestion is described as perfect, bowels fairly regular, and general health very good.

The urine analysis before the cure proved to be one of the most remarkable I have come across. The solids were *en masse* about normal though the volume was 54 per cent. above. Acidity was 39 per cent. below normal and urine 36 per cent. below, whilst the amount of uric acid reached the astounding



Miss B., July 31st.

Traces of true and modified biliary pigments, and also very slightly of scatol. Purins, 0.380. Urate of soda. Great numbers of epithelial cells.

August 20th, 1909.

Biliary pigments, true and modified, very abundant, as also scatol. Purins, 0.904. Urates and epithelial cells abundant.

figure of 116 per cent. above normal, chlorides only just 10 per cent. below, and phosphates 41 per cent. below.

In the second analysis, a day or two after the cure was finished, the urinary curve approaches sensibly to that of normal, acidity is now only *minus* 24 per cent., and urea 18 per cent. below normal, a gain of 18 per cent. Uric acid has fallen practically to normal—*plus* 8 only. Still, it is too high for the amount of urea, and I think another week or ten days' cure would have been advisable.

Strangely, with this enormous output of uric acid her blood pressure was but 120 mm., with a capillary reflex of 3½, and pulse of 80. At the end of the cure, with the enormous debacle of uric acid, her blood pressure was reduced to 115, which I look upon as normal for my apparatus.

At the end of the cure she described herself as perfectly well and vigorous —fit for any undertaking.

The great increase of purins is again an illustration of the inscrutability of their amount in relationship to other physiological processes.

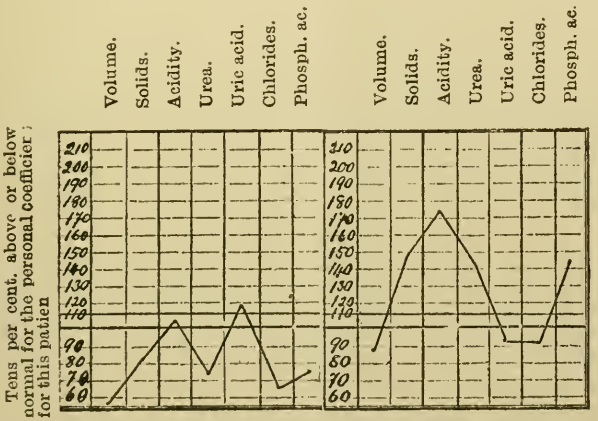
Case No. 6.

The next example I propose to put before you is interesting from several points of view. He is a typical example of that fat form of Frenchman that the English caricaturist delights in; secondly, he is mayor of the town, and has never drunk any other water but Vittel, though that appears to have been a most rare occurrence; lastly, he has been and is a most intense brain worker, always living under high pressure. He is a big and rapid eater, could not be called intemperate, but drinks heartily and takes no physical exercise. I have known him for years, and foresaw what was coming. He is jovial, good tempered, with his enormous charge of work as a busy lawyer, administrator of the town, and magistrate.

Mons. H. G. rises at 5 a. m., writes at his desk till 8 a. m., then takes café-au-lait, one cup and a roll. He continues the work at his office till midday and then eats a good lunch with wine followed by black coffee.

In the afternoon does either office work or goes in his motor car to different clients of the region for business, and takes during the afternoon a black coffee and two or three glasses of beer.

At 7 p. m. he dines, usually with a soupe-au-lait, with much bread, noodles, rice, and other farinaceous food. After dinner plays cards or other house amusements; during the season goes almost nightly to the theatre. Most of



Mons. G., June 27th, 1909.

Evident traces of glucose after defæcation with a lead salt. Biliary pigments, true and modified, well marked. Indican abundant. Scatol very abundant. Purins 1.147. Urate of soda very abundant, forming almost the totality of the deposit; a few cells, uric acid crystals in rosettes rather numerous and oxalate of lime fairly abundant.

September 6th, 1909.

No traces of glucose. True biliary pigments very slight. Modified biliary pigments well marked. Indican fairly abundant. Scatol abundant. Purins 0.770. Urate of soda, uric acid and oxalates but a fraction of what was found in first analysis.

my consultations with him were in the *entre-actes*. He is a good sleeper, seven to eight hours, but a small smoker, and a great lover of sweets.

On June 22nd he consulted me at my house, having come to the end of his tether. He has been getting daily stiffer, less capable of exertion, gets sleepy and incapable of concentrating his mind, is always tired, and is rapidly increasing in weight—he now weighs 115 kilos, his height being 1.68 metres, and his age 50. The family history is good, but several of his relations were fat.

His blood pressure was only 130 mm., but his heart muscle obviously failing. His capillaries are much dilated, giving him a very flushed and congested appearance.

The urine analysis is remarkable as showing the fluid starvation, the relatively high acidity, urea 26 per cent. below normal, uric acid 19 per cent. above, insufficient chlorides, and phosphates 25 per cent. below normal, the latter, no doubt, due to imperfect phosphatic assimilation, with the resultant failing brain activity.

He was ordered to do the cure, take either walking, cycling, or physical training exercise in the mechanotherapeutic institute. He was ordered a diet chiefly of meat, fish, and fowl, green vegetables, except the oxalate-bearing ones, fresh fruit and in compôte sweetened with saccharine, with the exception of grapes, bananas, figs, and other fruits of this kind. A little dry wine was allowed. Milk, butter, fats, farinaceous foods, sweets, disallowed.

For the first month, though fairly obedient for his dietary, he took his waters irregularly and did no exercise. His general state improved, but there was little diminution of weight. He bore badly electric light baths, feeling faint; but with shorter ones, and at a lower temperature, was able to continue.

Girths and Weights.

Date.	Chest.	Waist.	Hips.	Weights.
	Cm.	Cm.	Cm.	Kilos.
June 24th	112	116	117	105
July 4th	112	113	117	105
July 25th	109	105	113	101
September 8th	104	106	107	95

The result in general health was remarkable; he has gained all his elasticity of movements, his mental activity and promptness, and describes himself as feeling much younger. His circulation is better, his blood pressure has fallen 5 mm.; his pulse is now 48, but strong and vigorous.

The urine analysis of September 6th is a curious study, but is, I believe, partly due to the large amount of animal food he was taking.

CONCLUSIONS.

I have not given any example of a large number of cases of renal calculus and other renal and bladder troubles. These cases usually show marked improvement, and often their symptoms disappear for years or entirely, whilst others only show temporary advantage. I do not consider that these cases should be reported till two or three years after manifestations have disappeared.

Chronic nephritis and arterio-sclerosis are two groups of maladies that show marked improvement. Professor Huchard, who has devoted so much attention to arterio-sclerosis and subsequent heart failure, sends many dozens of patients here, with marked advantage. He and others who hold the toxi-alimentary view as to the main causation of that disease explain the action of the waters as being what I will call *vehicular*, or, in other words, their flushing effect. I quite agree that is an important element of their eliminating mechanism, but I think that there are two others that apply to both kidney and arterial degeneration. First, these non-chloride bearing waters lixiviate the excess of that salt out of the system in a dilute form, and by so relieving the kidneys of a heavy secretory work allow them time and energy to expel the toxic substances that their excessive chloride work prevented them from performing. In the next place the assimilable lime salts, to which so much attention has been drawn of late, may also take a therapeutic share in the effect.

Of neurasthenia I have always personally held the toxæmic view, and in all the cases of that disease treated by these waters I have had unfailing success. The group of ailments which we call neurasthenia is so polymorphous and requires such a long probation time to be declared as cured, that they are difficult to give striking examples of. This is all the more so that in most cases beyond the nervous and mental instability there are other organic disturbances requiring accessory treatment, and then the problem of which did the work becomes a very involved one. Such diseases as so-called gouty bronchitis as well as asthma, obviously two toxæmic diseases, show remarkable improvement and often cure, but here again the probation period should be not less than a year.

During several years' practice I have had a few young epileptics who came to accompany their parents. I was asked whether the cure would do them good, to which I replied that unquestionably for their general health it would. In three cases my astonishment was great at seeing their fits diminish in number and disappear without bromides; in two others this drug became much more effective. In several other cases only slight improvement accrued.

What is the meaning of this? Is it due to the removal of toxic substances, to the presence of which many authors attribute the epilepsy, or is it due to the lixiviation of the sodium chloride, which Vidal and others have shown to bear some relation to these explosive motor storms?

I am sorry that the few opportunities of observing this disease at Vittel prevents any useful study of the effect of the cure in these cases. It would be well worth the while to send any such cases which might open up a valuable method of treatment for this troublesome disease.

(Reprinted from the British Medical Journal of February 3rd, 1912.)

FURTHER EXAMPLES ILLUSTRATING CASES OF CHRONIC TOXÆMIAS AT VITTEL.

By H. J. Johnston-Lavis, M.D., D.Ch., M.R.C.S., etc.,

In July, 1910, I was able to bring forward a series of typical cases from my practice at Vittel during the previous season (1909). That paper led to a number of inquiries from many medical brethren, most of whom asked for more. Some varieties of chronic toxæmias were not represented, and I have tried in the present notes to, in part, fill up these gaps.

In practice at such a place one finds a large number of cases of a non-descript character, or at least appearing to be so to our imperfect knowledge or our insufficient means of determining in detail the loss of physiological balance or, in other words, the disease, which makes them appear to us as an uncoordinated group of symptoms. Such indefinable cases represent a large part of one's practice; they do the cure, get relief of their symptoms, and go on their way contented. I do not feel justified in quoting such cases, as they would rather tend to confuse our minds than to push our observations and deductions onward along the path of precise knowledge.

I have therefore limited these new examples of cases, with one exception, to definite morbid entities, to illustrate one or the other ailment that is dignified by a name and presumed to be of known pathology. Like those of the first series, their treatment is based fundamentally upon two principles, which may he defined as:

(1) The use of a vehicular water.

(2) The compensatory relief of the usual work to the kidneys, allowing them to do an equivalent of new work.

1. The first is the employment of a natural saline solution, just suitable, a little hypotonic to the blood, characterized physiologically by rapid assimilation, and, if the supply is kept up, by equally rapid excretion. So intense is the affinity of the blood for this water that when large quantities are being drunk a tendency to constipation is produced, showing that the blood is even stealing it from the food bolus, and also showing, not infrequently, marked thirst for more by patients drinking considerable quantities daily.

2. The second fundamental principle is compensatory relief of the kidneys. If a given horse can draw a load of two tons of coal, that horse will not be able to draw an additional ton of potatoes. If we take off a ton of coals, we can then replace that amount by a ton of potatoes. This principle is the one we follow in utilizing a non-chloride-bearing water, such as Vittel. If by a suitable diet we reduce the diurnal amount of sodium chloride, which we will put at 12 grams, to a practically accessible amount of 6 grams, we give our cellular structures a chance of giving up to the partly demineralized

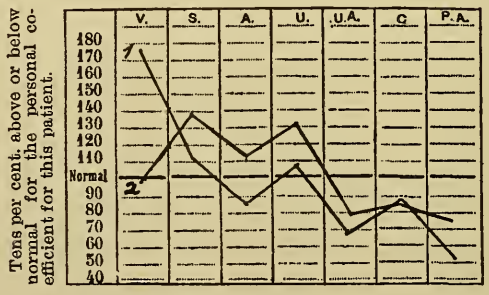
blood serum their store of uric acid and other toxic substances. At the same time our kidneys have a reserve energy for excreting their uric acid and other toxic substances to the equivalent of the diminished 6 grams of sodium chloride. This analogy will, I hope, make clear the mechanism of the lixiviating effects of such a mineral water as Vittel.

Case No. 1.

Mrs. C., aged 49. Blood pressure 140 mm.; capillary reflux 3; pulse 58; weight 72.200 kilos. When young had lung trouble, but has been gouty for three or four years, which, she says, is markedly hereditary. Last Christmas, after exercise, had dark water and a little pain, followed by rigors and giddiness, and finally renal colic. Shortly afterwards the stones dropped into the bladder under the influence of Vittel **Grande Source**, which had been ordered her. In a few days she passed two small uric acid stones.

She is a "good eater, but temperate in alcohol; her digestion is good, excepting for a little flatulence; has been constipated for some time, and has a thoroughly inactive skin. She has a fair sleep, but is a great dreamer, and has a bad mouth in the morning.

She came to Vittel feeling generally "down" or "seedy." The first urine analysis portrays the reason of this, as well as some remaining catarrh of the urinary passages. The urea-uric acid ratio is much disturbed. In addition to six glasses of **Source Salée** in the morning, and three of **Grande Source** in the



Case I.—Mrs. C. August 13th, 1910: Specific gravity 1015. Faint traces of biliary pigments, indican, and scatol. Purins 0.842. Extremely numerous pavement cells, some leucocytes, and very small crystals of uric acid. September 5th, 1910: Specific gravity 1027.5. Faint traces of true bile pigments, indican, and scatol. Purins 0.251. No deposits. V, Volume; S, solids; A, acidity; U, urea; U A, uric acid; C, chlorides; P A, phosphoric acid.

afternoon, she had massage under water every fourth day, and daily general massage with Pelciba iodine jelly. The unpleasant feeling soon disappeared. At the end of the cure all the elements of the urine are raised in quantity, showing that both nutrition and elimination have been improved. Blood pressure fell to 125 mm.; weight had fallen to 69.750 kilos, or a loss of 2.450 kilos (5½ lb.).

I have given this case as one where the principal symptoms indicate that they were due to water starvation, with resulting toxæmia and deposition of uric acid in joints and urinary passages and fat in the tissues. Outside this, I think we can argue very little from the analyses, and this is a good example of clinical success but speculative failure.

Case No. 2.

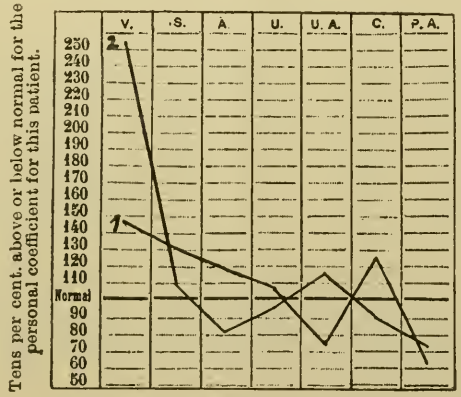
Dr. H., aged 48. Blood pressure 135; capillary reflux 2½; pulse 60; weight 64.650 kilos. Has always suffered from irritability of the bowels, with constipation and occasional diarrhœa. Spasmodic calls and mucous diarrhœa very slight. His digestion is good, he does not suffer from headaches, but always dreams. He is obviously neurotic.

He came to Vittel because he suffers from tendinous fibrosis, which attacks any group of muscles that are put to any new or special use. He exhibits large nodes on tendon sheaths at wrist, etc.

The first urine analysis shows an excess of solids due to too much chlorides, acidity a little raised, urea normal, but marked retention of uric acid, so that the ratio of urea to uric acid is much disturbed with imperfect phosphatic assimilation.

He was ordered a relatively low chloride-bearing diet, as free as possible from rich, xantho-uric-bearing foods, six glasses of **Source Salée** every morning, and three glasses of **Grande Source** in the afternoon, every alternate day a vapor bath and massage under water, to be followed by a rub down with Vigorax. Unfortunately, he was unable to afford but a little over a fortnight for the cure, notwithstanding which he declared himself as feeling much better, and the nodules on the tendon sheaths at the wrist had much diminished. The second analysis, made while still drinking the water, shows a much greater approach to normal, a great rise in the elimination of uric acid, so that the ratio of urea to uric acid was restored, and even slightly temporarily reversed, and the phosphates were rising.

This case had been treated by all sorts of imaginable drugs with little good, yet the improvement at Vittel was striking, considering the short time in which it could be carried out.



Case II.—Dr. H. August 1st, 1910; Specific gravity 1018. Traces of biliary pigments. Indican fairly marked. Purin 0.628. Numerous pavement cells and some sodium urate. August 15th, 1910: Specific gravity 1009. Sodium urate, a few leucocytes, and epithelial cells. Purins 0.328. V, Volume; S, solids; A, acidity; U, urea; U A, uric acid; C, chlorides; P A, phosphoric acid.

I take this to be a case of toxæmia of rheumatic facies, probably of intestinal origin, that, were one able to carefully study the intestinal flora, might be definitely classed, and perhaps even treated by an auto-vaccine.

Case No. 3.

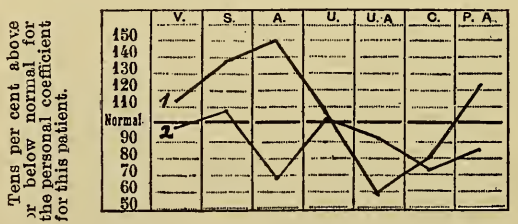
Major M. C., aged 42. Blood pressure 135 mm.; capillary reflux 4; pulse 70; weight 115.100 kilos; height 6 ft. 4 in.; is a big, powerful man. In 1902, in South Africa, had bad headaches, which continued till 1905, when albuminuria was detected. The following winter went to Egypt, and most of the summers since has gone to Contrexéville. He never had scarlet fever, but typhoid as a child, and also malaria. His father died of Bright's disease. He was put on vegetarian diet when his albumen was first discovered. His digestion is good; he now eats fish and chicken, and when abroad veal. He is a heavy smoker (pipe). His headaches are relieved by aspirin, and he takes Hunyadi for his constipation. Has had acute gout in toe.

The urine analysis made before the cure shows marked oxaluria, granular

cylinders, and 2.08 grams of albumen in the twenty-four hours. The patient wished to be reduced in weight, and the following was therefore the dietary ordered: "Avoid raw and cooked fats, greasy dishes, fried articles, salt and salted foods, pastry and farinaceous food, sweets, gravies, sweetbread, liver, kidneys, rhubarb, sorrel, spinach, asparagus, vinegar, etc." This would hardly be considered an ideal diet for an albuminuric patient, as he was reduced to rather a highly nitrogenous diet, with some vegetables and fruit. Nevertheless his blood pressure fell to 120 mm. Hg.; his capillary reflux from 4 to 3½, his pulse ranging from 66 to 70. His weight steadily fell to 111 kilos—that is, a loss of 4.100 kilos, or 9 lb., in eighteen days. Simultaneously his daily output of albumen was about half of that on his arrival. He took alternately daily a warm immersion bath for twenty minutes at 36° C. and a massage under water at 42° C. He felt much better. The marked acidity of the urine had become negative; the urea to uric acid ratio was restored.

At the height of his cure he was drinking seven glasses (half-pints or 300 cm.) of **Grande Source** before breakfast, which represents, amongst its other constituents, a considerable amount of lime salts, and yet his oxaluria and cylindruria had disappeared.

I have chosen this case as a type of one of the low-tensioned toxæmia albuminuric, and above all to illustrate how unfounded are Dr. Benjamin Moore's conclusions as to the injurious effects of calcareous waters in oxaluria. You will remark that this is a renal case without much hypertension, though



Case III.—Major C. August 13th, 1910: Specific gravity 1023. Albumen 2.08 grams per twenty-four hours. Traces of true and modified biliary pigments. Purins 0.696. Large uric acid crystals, some cells, large oxalate of lime crystals very abundant, and some granular cylinders. August 31st, 1910: Specific gravity 1022. Albumen 1.155 grams per twenty-four hours. Purins 0.789. Sodium urate very abundant; a few large crystals of uric acid in macles and rosettes, a few pure epithelial cells. No oxalates or casts. V, Volume; S, solids; A, acidity; U, urea; U A, uric acid; C, chlorides; P A, phosphoric acid.

no indications of any heart lesion could be found. I think we can interpret this case as one of imperfect metabolism and damaged renal structure which, by suitable lixiviation with a non-chloride bearing water, is soon restored to approximate normal, and might be so entirely if we physicians were not so often subjected to such curtailment of the time given to the cure by the patients themselves.

Case No. 4.

Mr. H. N., aged 55. Blood pressure 290 mm.; capillary reflux 3½; pulse 58; weight 67.700 kilos. Has suffered from albuminuria for years, neuralgias, lumbago, and from time to time oxaluria and much uric acid sand. Is a temperate man, both in food and drink; somewhat sedentary. He had been a patient of mine before, and had been warned to limit his salt food, which will explain the low quantity of this in his urine analysis. The only immediate complaint he had was bilateral nasal neuralgia.

The first urine analysis, the day before the commencement of the cure, shows excessive assimilation, though the urea to uric acid ratio is normal; his chlorides are low from intentional chloride starvation, and some phosphaturia is present. Biliary pigments and indican and scatol are much in excess.

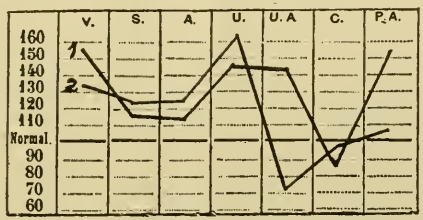
As he was obviously the type of hypertension of renal origin, his blood pressure was frequently noted during the cure.

The following are the records:

July 25th. Blood pressure 290 mm.; capillary reflux 3½, pulse 58.
July 30th. Blood pressure 240 mm.; capillary reflux 3½, pulse 58.
August 5th. Blood pressure 245 mm.; capillary reflux 3½, pulse 58.
August 10th. Blood pressure 240 mm.; capillary reflux 3½, pulse 58.
August 14th. Blood pressure 215 mm.; capillary reflux 3, pulse 62.

This is a striking example of what can be done in reducing blood pressure in a hypertensionist of renal origin. Simultaneously with this his albumen fell from 1.80 grams per diem to 0.425 gram, or less than a quarter of what it was.

Curiously his urea has somewhat augmented, but there has been a tremendously lixiviating effect on the uric acid, while the phosphaturia has dis-



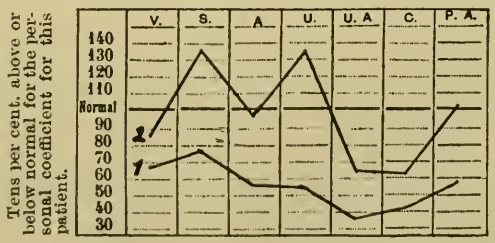
Case iv.—Mr. H. N. July 27th, 1910: Specific gravity 1018, Albumen 1.80 grams per twenty-four hours. True biliary pigments slight, but urobilin rather abundant, as also indican and scatol. Purins 0.802. Some rosettes of bicalcic phosphate, sodium urate, some crystals of uric acid, some leucocytes and epithelial cells. August 15th, 1910: Specific gravity 1022. Albumen 0.425 grams per twenty-four hours. Traces of reducible matters and of true biliary pigments. Indican and scatol marked. Purins 0.540. Some urates, uric acid, and a few leucocytes. v, Volume; s, solids; a, acidity; u, urea; u a, uric acid; c, chlorides; p a, phosphoric acid.

appeared. What the kidney lesion may be is doubtful. I have notes that in 1909 be had some cylindroids and kidney cells in the urine, but in 1910 we could find no trace of either.

I have just seen the patient (April, 1911). His blood pressure has risen in part—245 mm., and also his pulse, 76—but he walked quickly uphill to my villa just after lunch.

Case No. 5.

Rev. J. W. R., aged 68. Blood pressure 165 mm.; capillary reflux 3; pulse 80; weight 83.580 kilos. Had psoriasis some years since. Has had nasal



Case v.—Rev. J. W. R. August 13th, 1910: Specific gravity 1024.5. Glucose 10.35 grams per twenty-four hours. True biliary pigments sensible. Indican and scatol marked. Purins 0.391. Numerous crystals of uric acid in rosettes and isolated some leucocytes. August 22nd, 1910: Glucose 3.10 grams per litre after a meal. September 1st, 1910: Specific gravity 1028. Glucose *nil*. Faint traces of indican and scatol. Purins 0.319. Large and small crystals of uric acid. Very rare leucocytes. v, Volume; s, solids; a, acidity; u, urea; u a, uric acid; c, chlorides; p a, phosphoric acid.

catarrh for many years, and lately bad rheumatism in arms and back. Last August had bronchitis. Is a moderate eater, his digestion is fairly good, but he has suffered from dyspepsia, for which he got much advantage from Burroughs, Wellcome and Co.'s laxative tabloids and ½ grain of calomel weekly. Has been a golfer for twenty years. He gets dripping wet from perspiration before the

ninth hole is reached, and used to remain soaked till he changed for dinner. Three weeks since had a bad blow over liver from a motor car.

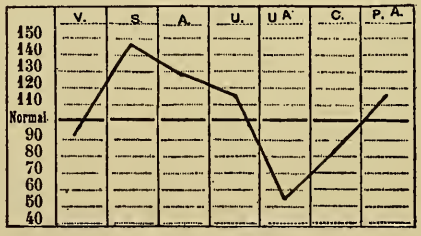
On his arrival he was markedly depressed and neurasthenic, said he was no longer able to do his work, talked of retiring, and was much troubled in consequence; doubted whether any cure could save him, etc., was too obese. The first urine analysis showed a very fair ratio between the different normal elements, though all were very much below the average. What, however, was unsatisfactory was the presence of 10.35 grams of glucose per diem.

His diet was suitably modified, and he soon worked up to nine glasses per diem of **Source Salée.** He had a massage under water every other day at 42° C., followed by a rub down with Vigorax.

Eight days later he felt much better, and we found 3.10 grams of glucose per litre.

On September 1st he felt quite fit to return to work. His blood pressure had fallen to 145 mm., with same capillary reflux and pulse. He had lost 3.280 kilos in weight, or over 7 lb. An analysis showed a marked improvement with a rise of all the elements. This is specially remarkable for the urea and phosphates, though the uric acid was still in part retained, especially as his diet was naturally rich in nitrogen. The chlorides insufficiency is due to privation in his diet. His glucose had fallen to less than a third in the twenty-four hours (3.10 grams).

This is a good example of glycosuria, neurasthenia, obesity, and visceral goutiness—four forms of toxæmia with some hypertension, all cleared up in a cure of less than three weeks at Vittel.



Case VI.—Mr. T. August 23rd. 1910: Specific gravity 1029. Traces of albumen and glucose. True biliary pigments sensible and traces of the modified, also traces of indican. Oxalate of lime in great abundance, but small. Uric acid crystals. Purins 0.352. V, Volume; S, solids; A, acidity; U, urea; U A, uric acid; C, chlorides; P A, phosphoric acid.

Case No. 6.

Mr. T., aged 22. Blood pressure 145 mm.; capillary reflux 4; pulse 68; weight 64.100 kilos. An otherwise healthy young university man, has suffered from intense seborrhœa capitis for sixteen years, and for a long time a lichenoid growth extending out on the groins and some inches down the thighs and on to the buttocks. He has usually a very dry skin, excellent digestion, is a moderate eater, temperate, hardly smokes, and has his bowels regular.

The urine analysis shows a marked disturbed ratio urea to uric acid, intense oxaluria, traces of albumen and sugar, some biliary pigments, and traces of indican.

He was ordered Pelciba briliantine for the head and Pelciba antiseptic nearly pure on the skin lesions. At the end of about ten days, when he was called away, both the scalp and the groins were nearly well, and later a letter from him says that he was practically cured excepting for some brown stains on the site of the lichenoid eruption. He had continued the treatment by drinking Vittel water at home. A year later reports perfect health.

I might continue to cite a large number of other similar examples, or some almost miraculous cures, but these latter are always open to the accusation of *post hoc propter hoc.* What, however, is interesting is that a not inconsiderable number of cases drift here independent of medical advice and

often contrary to it, and get better. Another section is formed by those sent by their medical advisers as a last resource in diagnostic and therapeutic despair. In nine-tenths of such cases a sentiment of gratitude and respect is engendered towards their medical advisers, which clinches the tie between patient and physician for the future.

CLINICAL HISTORY OF VARIOUS CASES TREATED WITH THE VITTEL WATERS.

By Dr. F. Constant of Paris, France.

Chronic Rheumatism.

H....., 38. Father was afflicted with chronic rheumatism, patient a sufferer from eczema, nephritic colics, and chronic rheumatism which began five years ago and involves the knee and ankles. Sedentary habits, no alcoholism. Marked creaking sounds on flexion and extension of the knee.

Under increasing, later decreasing, doses of the **Grande Source,** douches and steam baths, a considerable improvement was obtained. Patient went home, took Vittel water ten days every month. Another course of treatment completed the cure.

Chronic Rheumatism.

M....., 57. Bookkeeper. Sedentary habits, hearty eater. Had had nephretic colics almost regularly once a year for fifteen years, then a free interval of four years, followed by new and more violent attacks. Also pains in joints of the lower limbs (slight limping) and in the vertebral column. Fine creaking sounds in left knee, on motion.

Pulmonary emphysema. Moderate arteriosclerosis, dilated stomach, highly neurotic temperament. Frequent vertigo. Great excess of water in the urine.

Increasing doses of Vittel **Grande Source** water, warm douches followed by rubbing, or warm bath with massage.

After twelve days, patient had reached a consumption of three quarts of **Grande Source** every morning. Improvement was manifest. The amount was then progressively decreased and, 10 days later, the patient went home. Every month he took **Grande Source** water for ten days. The winter and next spring passed without nephretic colics, there still was a little gravel in the urine. The pains in the joints had disappeared, barring an occasional twinge. The knee was free from "crepitation" and walking was painless and easy.

Chronic Rheumatism and Cystitis.

B....., 38. Symptoms of cystitis dating back two years, and developed after an operation for inguinal hernia of the bladder. Some frequency of urination and pain on pressure on the hypogastrium. For the past three years, pains in joints. No sedentary habits, hard outdoor life.

Fine crepitation on motion of right shoulder. Motion slow and painful. Wrist and finger joints somewhat stiff. No muscular atrophy, but diminished muscular power. Marked crepitation in right knee; no pain.

Patient was treated by diet and increasing doses of Vittel **Grande Source** water, up to 2½ quarts; then the amount was progressively decreased. To this were added hot douches or baths with massage.

The pyuria disappeared and frequency decreased. In three weeks a complete recovery was obtained. The articular symptoms were much improved. The right shoulder alone remained painful. Patient was advised to take Vittel water ten days every month.

Mr. B....., 40 years of age, belongs to a family where rheumatism and gout are frequent.

Sedentary habits, much intellectual work, practically no physical exercise. Fairly hearty eater.

Chronic articular rheumatism for the past 10 or 12 years, particularly affecting the knee, shoulder and wrist. Muscular pains, particularly in the nape of the neck. Never had acute articular rheumatism, nor gout, but has two or three sick headaches a month, and besides, is dyspeptic and constipated. Slight arteriosclerosis, heart normal. The liver is hypertrophied and extends half an inch below the costal border. Urine normal except for a slight excess of urates.

Under the influence of diet and increasing doses, one to three pints of **Grande Source** in the morning and a steady dose of **Source Salée** (about a pint) in the evening, the constipation improved, the hepatic hypertrophy disappeared and the joints limbered up. Patient, after going home, took **Grande Source** water for 10 days every month, and thus could spend a comfortable winter, with but very little of the pain that had been a prominent feature of all previous winters and springs. The occasional twinges of pain, besides coming at long intervals, were of a very transitory character.

Subacute Rheumatism. Muscular Atrophy.

G....., 51. Sedentary habits, no physical exercise, hearty eater. For the past four or five years has had pains in joints and muscles, then cramps, tingling or burning sensations in the limbs.

Two years ago had an attack of subacute articular rheumatism. Duration three weeks. Four months later, relapse, followed by stiffening of both shoulder joints, the motion of which is very limited, and cause marked crepitation.

The deltoid and all the muscles of the right arm are atrophied. The wasting is still more marked on the left side. "Sand" in the urine.

Increasing doses of **Grande Source** up to 2¾ quarts. Electricity and massage. After one season, the patient goes home much improved. The use of Vittel water and massage was kept up during all the winter. After a second season in Vittel, the cure was complete.

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